

WE CLAIM:

- 1 1. An optical transmitter comprising:
2 a Mach-Zehnder optical modulator having an RF input port, a bias voltage input
3 port, an optical carrier input port and an optical output port;
4 a wavelength division multiplexer (WDM) having two input ports and an output
5 port, the output port coupled to said optical carrier input port of said Mach-Zehnder optical
6 modulator; and
7 two optical carrier sources having different wavelengths coupled to said input
8 ports of said WDM.
- 1 2. The optical transmitter as recited in claim 1, further including a bias control
2 circuit coupled to said bias voltage input port.
- 1 3. The transmitter as recited in claim 1, wherein said bias control circuit includes
2 a pair of photodetectors and a wavelength division multiplexer (WDM).
- 1 4. The transmitter as recited in claim 3, wherein said WDM and said pair of
2 photodetectors are coupled to said optical output port of said Mach-Zehnder modulator.
- 1 5. The optical transmitter as recited in claim 1, wherein said two optical carrier
2 sources are provided by lasers having different wavelengths.
- 1 6. The optical transmitter as recited in claim 4, further including means for
2 dithering the Mach-Zehnder modulator bias voltage.
- 1 7. The optical transmitter as recited in claim 1, further including an optical
2 amplifier coupled to said output port of said Mach-Zehnder modulator.
- 1 8. An analog demodulator comprising:
2 a wavelength division multiplexer (WDM) having an input port for receiving
3 optical signals from a single optical link having multiple wavelengths and separating the
4 wavelengths at its output ports;
5 a plurality of photodetectors said photodetectors coupled to said output ports of
6 said WDM such that each photodetector is coupled to an output port of said WDM having a
7 different wavelength signal; and
8 a summing junction for summing the outputs from said photodetectors.

1 9. The optical demodulator as recited in claim 8 further including an optical
2 amplifier for amplifying the input signals to said demodulator forming an optical receiver.

1 10. An optical system comprising:

2 an optical transmitter, said optical transmitter including an optical modulator for
3 modulating an RF input signal onto an optical carrier signal having multiple wavelengths and
4 defining an RF modulated optical signal;

5 an optical receiver for demodulating said RF modulated optical signal and
6 providing an RF output signal; and

7 an optical link connecting said optical transmitter and said optical receiver.

1 11. The optical system as recited in claim 10, wherein said optical link is a fiber
2 optic cable based link.

1 12. The optical system as recited in claim 10, wherein said optical link is in free
2 space.

1 13. The optical system as recited in claim 10, wherein said optical modulator is a
2 Mach-Zehnder modulator having an RF input port, a bias voltage input port, an optical carrier
3 input port, and an optical output port.

1 14. The optical system as recited in claim 13, wherein said optical transmitter
2 includes a wavelength division multiplexer (WDM) and said optical carrier signal having
3 multiple wavelengths is formed from a plurality of carrier signals having different wavelengths
4 for providing an optical carrier signal to said optical carrier input port of said Mach-Zehnder
5 modulator, said optical transmitter also including a plurality of sources of carrier signals at
6 different wavelengths which are applied to said WDM.

1 15. The optical system as recited in claim 14 further including a bias control
2 circuit, said bias control circuit applied to said bias voltage input port.

1 16. The optical system as recited in claim 15, wherein said bias control circuit
2 includes a wavelength division multiplexer (WDM) and a pair of photodetectors.

1 17. The optical system as recited in claim 16, wherein said WDM and said pair
2 of photodetectors are coupled to said output port of said Mach-Zehnder modulator.

1 18. The optical system as recited in claim 17, wherein said optical receiver
2 includes a wavelength division multiplexer (WDM) for receiving said RF modulated optical
3 signal and demultiplexing said RF modulated optical signal into separate wavelength signals
4 and a plurality of photodetectors coupled to said WDM for photodetecting the separate
5 wavelength signals separately and generating corresponding multiple photodetector current
6 signals, said optical receiver also including a summing junction for summing said
7 photodetector currents.

1 19. The optical system as recited in claim 18, further including one or more
2 optical amplifiers.

1 20. The optical system as recited in claim 19 wherein said one or more optical
2 amplifiers are connected to one or the other of said optical transmitter and said optical
3 receiver.

1 21. The optical system as recited in claim 20, including at least two optical
2 amplifiers, one optical amplifier connected to said optical transmitter and one optical amplifier
3 connected to said optical receiver.

1 22. An optical transmitter comprising
2 a Mach-Zehnder optical modulator having an RF input port, a bias voltage input
3 port, an optical carrier input port and an optical carrier output port; and
4 means for providing two optical sources having different wavelengths.

1 23. The optical transmitter as recited in claim 22, wherein said providing means
2 includes a single laser which produces two optical carriers having different wavelengths.

1 24. The optical transmitter as recited in claim 22, wherein said providing means
2 includes a wavelength division multiplexer and two optical carrier sources.